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**Southwestern
Region**

Forest Pest Management Report

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ANNUAL SOUTHWESTERN REGION
PEST CONDITIONS REPORT
1992

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APRIL 1993

By

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FORWARD

The status of major insects and diseases in Southwestern forests in 1992 is summarized in this report. Much of the information is based on aerial and ground surveys conducted by Forest Pest Management Specialists, Southwestern Region, and State Pest Management Specialists of the Division of Forestry, Arizona State Land Department, and the New Mexico Department of Agriculture. These surveys report short-term changes in pest activity, as well as indicating long-term trends when compared to previous surveys.

As in the past, Forest Pest Management Specialists have compiled the information for lands of all ownerships; if required, further information and additional copies of this publication are available upon request.

ACKNOWLEDGEMENTS

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CONDITIONS IN BRIEF

In the Southwest, total acres of bark beetle-killed trees decreased from 107,620 acres in 1991 to 32,925 acres in 1992. Within the ponderosa pine forest cover type, roundheaded pine beetle in combination with the western pine beetle and Mexican pine beetle caused the majority of the volume losses (1,840,000 cubic feet) followed by Ips engraver beetle (223,050 cubic feet), and mountain pine beetle (52,750 cubic feet). In the mixed conifer and spruce forest cover types, Douglas-fir beetle and true fir beetle attacks caused an estimated 196,250 and 213,800 cubic feet of volume loss, respectively, and spruce beetle, 63,000 cubic feet of volume loss.

Insect defoliator activity Regionwide decreased from 247,760 acres in 1991 to 41,510 acres in 1992. Most of this defoliation (20,550 acres) was due to an aspen insect and disease complex composed of the large aspen tortrix, western tent caterpillar, and Marssonina leaf blight. The remainder of the defoliation (20,960 acres) was caused by western spruce budworm in the mixed conifer forest cover type.

Dwarf mistletoes continued to be the primary agent causing growth loss in both ponderosa pine and mixed conifer forests. Both direct and indirect evidence suggests that the incidence and severity of these parasites has increased during this century.

Root and butt rots are another important group of diseases in the Southwestern Region. They contribute to total volume loss and create hazard trees in campgrounds and along roadways. Similar to other indigenous diseases, root and butt rots are also beneficial to some wildlife species because they create snags and downed logs. The most common root rots in the Region are Armillaria sp. and Heterobasidion annosum. The incidence in mixed conifer and spruce fir cover types is higher than in the pine cover type. The total number of trees killed by root disease in mixed conifer and spruce fir cover types combined is about the same as for the pine cover type.

White pine blister rust occurs throughout the range of southwestern white pine on three Ranger Districts of the Lincoln National Forest and the Mescalero Apache Indian Reservation in New Mexico. It has not been detected elsewhere in the Region.

STATUS OF PREDOMINANT INSECTS IN 1992

Roundheaded pine beetle, Dendroctonus adjunctus, western pine beetle, Dendroctonus brevicomis, and larger Mexican pine beetle, Dendroctonus approximatus

Tree mortality caused by roundheaded pine beetle activity in combination with western and Mexican pine beetles decreased from 91,320 acres in 1991 to 22,190 acres in 1992. As in 1991, most of the mortality occurred on the Lincoln National Forest, (9,313 acres) and the Mescalero Apache Indian Reservation (11,385 acres), in New Mexico. An outbreak of roundheaded pine beetle was detected in the Pinaleno Mountains, covering 750 acres. Approximately 3,400 trees of varying diameters have been-killed so far. Mortality has occurred in this area since 1988, becoming epidemic in 1991. Small pockets of western pine beetle caused tree mortality occurred on the Apache-Sitgreaves and Coconino National Forests, the Navajo, Fort Apache, and San Carlos Apache Indian Reservations, and Saguaro National Monument, Arizona; and the Cibola and Gila National Forests, New Mexico. Volume losses resulting from these bark beetles were estimated at 1,840,000 cubic feet.

Roundheaded and western pine beetles are at outbreak levels on State and private lands south of Ruidoso, New Mexico. Populations appear to be building north of Ruidoso.

Western spruce budworm, Choristoneura occidentalis

Defoliation caused by the larvae of the western spruce budworm decreased from 218,613 acres in 1991 to 20,960 acres in 1992. Defoliation occurred on the Apache-Sitgreaves (5,070 acres), Coconino (950 acres), and Kaibab (5,490 acres) National Forests, Arizona; and the Gila (480 acres), Lincoln (40 acres) and Santa Fe (1,600 acres) National Forests, New Mexico. On State and private lands in New Mexico, approximately 7,115 acres of budworm defoliation occurred in Rio Arriba, Mora, Cibola, and Colfax Counties.

Other insect activity of lesser significance occurring in the Region in 1992 are summarized below. Acres affected and estimates of volume loss caused by the roundheaded, western, and the larger Mexican pine beetle complex, western spruce budworm and insects described below are summarized by administrative unit in the Appendix.

TABLE 1. Status of Other Insects Occurring in Arizona and New Mexico in 1992.

Insect	Host	Location	Remarks
Douglas-fir beetle *Dendroctonus pseudotsugae*	Douglas-fir	Arizona, New Mexico	Douglas-fir beetle activity decreased slightly Regionwide from a total of 2,780 acres in 1991 to 2,230 acres in 1992. Small group tree mortality (2 to 10 trees) occurred on the Apache-Sitgreaves, Coconino, Coronado, Kaibab and Tonto National Forests, Fort Apache Indian Reservation, and the Saguaro National Monument, Arizona; and the Carson, Cibola, Lincoln, and Santa Fe National Forests and Taos Pueblo Indian Reservation and Navajo Indian Reservation, New Mexico. On State and private lands, Douglas-fir beetle-caused tree mortality declined considerably. The most notable decline occurred in Cimarron Canyon and on the Philmont Scout Ranch in Colfax County. Losses resulting from Douglas-fir beetle attacks in 1992 approximated 196,250 cubic feet of volume Regionwide.
Douglas-fir tussock moth *Orgyia pseudotsugata*	Douglas-fir	Arizona New Mexico	In Arizona suboutbreak population levels of this insect were detected in the Pinal Mountains, Tonto National Forest. Populations appear to be on the rise in this area. Defoliation was observed on understory white fir and Douglas-fir trees in this area. Low populations were detected in the Sierra Ancha Mountains, Tonto National Forest. In New Mexico, tussock moth defoliation occurred but was less severe in Santa Fe, Los Alamos, White Rock, and Alto on ornamentals. No new tussock moth defoliation was reported in Espanola, Cedar Crest, Raton, or Ruidoso. No forest infestations were found in New Mexico.
Fall webworm *Hyphantria cunea*	Siberian elms Cottonwoods	New Mexico Arizona	Fall webworm numbers were up Statewide in hardwoods, especially Siberian elms and cottonwoods.
Mountain pine beetle *Dendroctonus ponderosae*	Ponderosa pine	New Mexico	Mountain pine beetle-caused ponderosa pine mortality decreased slightly from 1,440 acres in 1991 to 1,170 acres in 1992. Scattered, small groups of tree mortality (2 to 10 trees) were observed on the Carson, and Santa Fe National Forests and the Navajo and Santa Clara and Taos Pueblo Indian Reservations, New Mexico. Volume losses resulting from these bark beetles were estimated at 52,750 cubic feet.
Pandora moth *Coloradia pandora*	Ponderosa pine	Arizona	No pandora moth defoliation was detected in 1992.

Table 1. Status of other insects occurring in Arizona and New Mexico--continued

Insect	Host	Location	Remarks
Pine engraver beetles *Ips* spp.	Ponderosa pine	Arizona, New Mexico	Ponderosa pine mortality resulting from pine engraver beetle attacks decreased from 11,030 acres in 1991 to 3,830 acres in 1992. Small groups of fading trees (2 to 10 trees per spot) and occasional large group tree mortality (25 trees and larger) occurred on the Apache-Sitgreaves, Coconino, Kaibab, Prescott, and Tonto National Forests, Fort Apache, and San Carlos Apache Indian Reservations, and Saguaro National Monument, Arizona; and Cibola, and Santa Fe National Forests and Navajo Indian Reservation, New Mexico. On private lands in New Mexico, pine engraver beetles continued to breed in down, windblown spruce above the Brazos Cliffs in northern Rio Arriba County. Engraver beetles were also found in timber sale areas near the Tierra Amarilla Land Grant and may also be responsible for top-killing large ponderosa pines in the Elkins timber sale area near Mt. Taylor. Engraver beetles also continue to be a problem in pinyon and ponderosa pines growing near construction sites. Volume loses Regionwide were estimated at 223,050 cubic feet.
Pine sawflies *Zadiprion spp.* *Neodiprion spp.*	Ponderosa pine Pinyon pine	New Mexico	Winter-feeding larvae of *Zadiprion townsendii* were observed at several locations on private lands around Santa Fe and along roadside trees west of Cedar Crest. Pinyon sawflies were also reported defoliating pinyons in San Juan and Santa Fe Counties.
Pinyon pine needle scale *Matsucoccus acalyptus*	Pinyon pine	New Mexico	Defoliation caused by this scale insect occurred on 300 acres of private land north of Carrizozo, 500 acres south and east of Silver City, a large area southwest of Socorro, 150 acres between El Rito and Ojo Caliente in Rio Arriba County and over 10 acres 15 miles south of Willard in Torrance County. Pinyon needle cast in 1992 may have helped reduce pinyon pine needle scale populations where they both occur.
Pinyon pine needle miner *Coleotechnites educola*	Pinyon pine	New Mexico	Intensity of defoliation on private lands by this insect increased on the south side of Santa Fe. Total area infested remained at approximately 500 acres.

Table 1. Status of other insects occurring in Arizona and New Mexico--continued

Insect	Host	Location	Remarks
Pine tip moths *Rhyacionia spp.*	Ponderosa Pine	New Mexico	The Southwestern pine tip moth and an unidentified later emerging tip moth species continued to cause some damage to a research ponderosa pine plantation in Mora despite spraying with Cygon 2 years in a row. The Southwestern pine tip moth also damaged some landscape pines in communities over 6,500 feet. Nantucket pine tip moth continues to seriously deform young landscape pines in Albuquerque and southern New Mexico.
Twig beetles *Pityophthorus spp.*	Ponderosa pine Pinyon pine Douglas-fir	Arizona New Mexico	In Arizona, branch dieback was observed on ponderosa pine on the San Francisco Peaks and in the vicinity of Woody Mountain, near Flagstaff. In New Mexico, branch dieback was observes southeast of Santa Fe on pinyon, and on Douglas-fir and southwestern white pine near Cloudcroft. Some mortality occurred in both pinyon pine and Douglas-fir. Twig beetles continued to be a serious problem in landscape pines and the main cause of balled and burlapped pinyon and ponderosa pine mortality.
Ponderosa pine needle miner *Coleotecnites ponderosae*	Ponderosa pine	New Mexico	This needle miner defoliated extensive areas of ponderosa pine on private lands south of Mora. Needle miner damage covered 2,960 acres in San Miguel County, up from 500 acres in 1991. Needle miner populations resurged near Mineral Hill causing light defoliation to pines there. However, the heaviest defoliation caused by these insect occurred from Sapello to Mora.
Prescott Scale *Matsucoccus vexillorum*	Ponderosa pine	Arizona	Branch dieback, caused by Prescott Scale, continued to occur on the Fort Apache Indian Reservation. Approximately 1,100 acres are affected.
Spruce beetle *Dendroctonus rufipennis*	Spruce	Arizona New Mexico	Spruce beetle-caused tree mortality increased from 430 acres in 1991 to 1,055 acres in 1992. Scattered groups of dead fading trees (two to five trees per spot) occurred on the Apache-Sitgreaves National Forest, Arizona; and the Cibola, Lincoln, and Santa Fe National Forests, Mescalaro Apache and Navajo Indian Reservations, New Mexico. On State and private lands in New Mexico, spruce beetle were detected in a spruce timber sale area above the Brazos Cliffs near Tierra Amarilla as well as in a spruce-fir

Table 1. Status of other insects occurring in Arizona and New Mexico--continued

Insect	Host	Location	Remarks
			cutting area several miles southeast of the Brazos Cliffs. Current years volume losses from spruce beetle attacks approximated 63,000 cubic feet.
White fir needle miner *Epinotia meritana*	White fir	Arizona	No white fir needle miner defoliation was detected in the Region in 1992.
PEST COMPLEXES			
Aspen defoliation			
Large aspen tortrix *Choristoneura conflictana* Western tent caterpillar *Malacosoma californicum* Marssonina leaf blight *Marssonina populi*	Aspen	Arizona, New Mexico	Defoliation caused by this insect and disease complex decreased Regionwide from 29,140 acres in 1991 to 20,550 in 1992. Pockets of aspen defoliation occurred on the Apache-Sitgreaves, Coconino, Coronado, Kaibab, Prescott National Forests, and Fort Apache Indian Reservation, Arizona; the Carson, Cibola, Gila, Lincoln, and Santa Fe National Forests and the Mescalero, Santa Clara Pueblo and Navajo Indian Reservations, New Mexico.
True Fir Mortality *Scolytus ventralis* (in white fir); *Dryocetes confusus* (in subalpine fir) *Armillaria* spp. *Heterobasidion annosum*	White Fir Subalpine fir	Arizona, New Mexico	True fir mortality resulting from this insect and disease complex remained relatively unchanged from 1991 levels. In 1991 mortality was detected on 2,495 acres and in 1992 on 2,450 acres. Small groups of dead fading firs were observed on the Apache-Sitgreaves, Coconino, Coronado, Kaibab, and Tonto National Forests, Fort Apache Indian Reservation, and the Chiricahua National Monument. Numerous small to large groups of mortality were observed on the northeast side of the Kaibab Plateau (North Kaibab Ranger District). Historical Forest Pest Management records show that white fir needle miner caused significant mortality over much of the same area in 1987 thru 1989. Ground checks of these groups revealed the presence of *Scolytus ventralis* and root disease. Estimated volume losses from this insect and disease complex approximated 213,000 cubic feet.

STATUS OF PREDOMINANT DISEASES IN 1992

Dwarf mistletoes, Arceuthobium spp.

Dwarf mistletoes are the most significant disease-causing agents in the Southwestern Region. These parasitic plants drain water and nutrients from their host tree and eventually can kill it. The impact of these parasites on timber production has been recognized for decades, and considerable attention has been given to their silvicultural control. Most notably, a large proportion of timber sale cutting units have been located within infected stands.

Recently dwarf mistletoe control has become a controversial subject. Many people have said that dwarf mistletoe has been used as an excuse to cut timber, and there is undoubtedly some truth in this assertion (although it oversimplifies a complex situation.) Moreover, there has been much emphasis recently on the fact that dwarf mistletoes are a natural part of the forest ecosystem, and that they provide benefits to some wildlife species.

At the same time, most experts agree that there is probably more dwarf mistletoe in our forests now than there was in "pre-settlement" times. Research indicates that major changes have occurred in stand structure, largely due to many decades of wildfire suppression. Moreover, it is widely accepted that periodic wildfire tended to reduce levels of dwarf mistletoe. Fire suppression, along with selective logging practices have led to gradually increasing dwarf mistletoe populations.

Although there has been a relatively large amount of dwarf mistletoe in our Southwestern forests for tens of thousands of years, there is little question that human activities have led to gradually increasing levels. Given our concern with forest and ecosystem sustainability, along with society's demand for forest products both now and long into the future, wise management of these pests seems indicated. It should be recognized that dwarf mistletoes are difficult to control, and that many types of cutting will tend to increase the incidence and severity of these parasites over the long term.

True mistletoes, Phorodendron spp.

The true mistletoes may be less damaging than their dwarf counterparts because they manufacture much of their own food. However, there are many woodland areas in the National Forests, National Parks, and Indian Reservations of the Southwest that are significantly impacted by these green parasites. Heavily infected areas suffer significant growth loss and mortality, particularly during periods of severe moisture stress.

White pine blister rust

This non-native fungal disease (Cronartium ribicola) occurs nearly throughout the range of southwestern white pine (Pinus strobiformis) in the Sacramento Mountains of Southern New Mexico. Nearly half a million acres are affected. This area contains what is probably the largest population of this tree species in the world. The rust will have a severe impact during the next several decades.

Efforts are being made to reduce the chance of the disease being spread to other parts of the Region, and we are exploring opportunities to work with genetic resistance to the rust.

Root diseases

Root diseases and their associated pests are responsible for about one-third of the conifer mortality Region-wide (if data collected in the five northern forests in Region 3 can be extrapolated over the whole Region). Armillaria spp. (shoestring root rot) account for 78 percent and Heterobasidion annosum (annosus root rot) for 22 percent of the root diseased trees. Phaeolus schweinitzii (schweinitzii root and butt rot) and Inonotus tomentosus (tomentosus root disease) are two other root diseases but they cause little mortality. Though a higher percent of the mortality in the mixed conifer and spruce-fir types was caused by root diseases than for the pine type about the same number of trees were killed for the mixed conifer and spruce-fir types together as were killed for the pine type. Root disease contributes to the development of hazard trees in recreation sites and will prevent the establishment of host trees on an infected site for many years. Root diseases can result in the production of wildlife trees in the short term but will eliminate most host trees from a site eventually.

Pinyon Foliage Diseases

A needle-cast affecting pinyon pine was widespread and quite prominent in several portions of New Mexico, particularly on the Lincoln and portions of the Gila National Forests. Positive identification of the fungus causing the disease was not made. A rust disease affecting pinyon foliage was detected in portions of northern New Mexico. A species of Coleosporium was identified as the causal agent.

Table 2. Status of Other Diseases Occurring in Arizona and New Mexico

Disease	Host	Location	Remarks
STEM AND BRANCH DISEASES			
Dwarf mistletoes *Arceuthobium* spp.	Douglas-fir, Spruces Pines	Arizona, New Mexico	Dwarf mistletoes are the most widespread pests in the Region. Approximately 46 percent (2.2 million acres) of the total commercial acreage (4.8 million acres) is infected, accounting for greater than 25 million cubic feet of volume loss. Aesthetic value and longevity of trees in recreation areas and visual corridors are also impacted.
Red rot *Dichomitus squalens*	Ponderosa pine	Arizona, New Mexico	Red rot decay is distributed throughout the Region and is the most common cause of decay in living ponderosa pine in the Southwest.
Red ring rot *Phellinus pini*	Douglas-fir, Ponderosa pine, Spruce, True firs	Arizona, New Mexico	*Phellinus pini* is indigenous to mature and overmature stands of pine and mixed conifers. Its distribution is scattered and losses and damages are minimal in most stands.
Rust-red stringy rot *Echinodontium tinctorium*	White Fir	Arizona, New Mexico	This fungus is found in mature and overmature stands of mixed conifers.
Aspen trunk rot *Phellinus tremulae*	Aspen	Arizona, New Mexico	Aspen trunk rot is the most common cause of decay in mature aspen stands throughout the Region.
Atropellis canker *Atropellis* spp.	Southwestern White Pine	New Mexico	This canker disease is common and locally abundant on the Lincoln National Forest and Mescalero Apache Indian Reservation, but is not causing major damage.
Aspen stem cankers *Encoelia pruinosa* *Ceratocystis fimbriata* *Cryptosphaeria populina* *Hypoxylon mammatum* *Cytospora chrysosperma*	Aspen	Arizona, New Mexico	These canker fungi cause significant reductions in growth and vigor of mature aspen stands. In Region 3, stands often have over 30-percent infection with canker fungi. In campgrounds, stem cankers are typically more prevalent due to damage from campers.
Spruce broom rust *Chrysomyxa arctostaphyli*	Spruce	Arizona, New Mexico	Spruce broom rust is scattered throughout the host type but is of little commercial significance.
Comandra blister rust *Cronartium comandrae*	Mondell pine, Ponderosa pine	Arizona	Comandra blister rust occurs on exotic mondell and native ponderosa pines in the Payson, Sedona, and Prescott areas. Damage is to individual trees in landscape areas and Christmas tree plantations.

Table 2. Status of Other Diseases in Arizona and New Mexico--continued

Disease	Host	Location	Remarks
Fir broom rust *Melampsorella caryophyllacearum*	True firs	Arizona New Mexico	Fir broom rust is widely distributed throughout the subalpine, corkbark, and white fir habitat types in the Southwest. Damages typically consist of stem and branch swellings, dead tops, and stem breakage.
Melampsora rusts *Melampsora spp.*	Aspen Willow	Arizona New Mexico	Due to the high rainfall of 1992, Melampsora rust infection was moderate to severe in aspens and willows throughout the Region. Early defoliation occurred in the more susceptible clones.
Limb rust *Cronartium arizonicum* *Peridermium filamentosum*	Ponderosa pine	Arizona	Small group (two to three trees) infections are located throughout the ponderosa pine forests of the Southwest.
White pine blister rust *Cronartium ribicola*	Southwestern white pine	New Mexico	Cankers have been observed throughout the host range on the Cloudcroft, Mayhill, and Smokey Bear Ranger Districts, and on the Mescalero Apache Indian Reservation. Several hundred acres of young plantations on the Cloudcroft Ranger District are severely infected. Visible damage is increasing
ROOT DISEASES			
Annosus root disease *Heterobasidion annosum*	Ponderosa pine, True firs, Spruces, Douglas-fir	Arizona, New Mexico	In Arizona and New Mexico, root and butt rot pathogens are responsible for 34 percent of the trees killed. Infection in some conifer stands is greater than 25 percent. *Armillaria* sp. account for 78 percent of root disease damage in confers *Heterobasidion annosum* is responsible for the remaining 22 percent. The Southwest an estimated 4.8 million cubic feet annually to root rot.
Armillaria root disease *Armillaria* sp.	Douglas-fir, Ponderosa pine, True firs Spruce Aspen	Arizona, New Mexico	
Black stain root disease *Leptographium wageneri* var. *wageneri*	Pinyon pine	Arizona, New Mexico	
Schweinitzii butt rot *Phaeolus schweinitzii*	Douglas-fir, True firs	Arizona, New Mexico	
Tomentosus root rot *Inonotus tomentosus*	Spruce	Arizona, New Mexico	
White mottled rot *Ganoderma applanatum*	Aspen	Arizona, New Mexico	

Table 2. Status of other diseases occurring in Arizona and New Mexico--continued

Disease	Host	Location	Remarks
FOLIAGE DISEASES			
Elytroderma deformans	Pinyon pine, Ponderosa pine	Arizona, New Mexico	Elytroderma disease is widely distributed but at low levels.
Lophodermella cerina	Ponderosa pine	New Mexico	In 1992 this needle-cast was detected in several locations in the State. Approximately 19,000 acres showed discoloration during aerial detection surveys, a slight increase from 1991.
Pinyon Needle Cast	Pinyon pine	New Mexico	This disease was severe on the Lincoln and portions of the Gila National Forest.
Coleosporium jonesii	Pinyon pine	New Mexico	Needle rust was detected in northern New Mexico, near Tesuque.
Taphrina caerulescens	Gambel oak	Arizona	Significant defoliation occurred on the Kaibab and Coconino National Forests.
Apiognomia veneta	Arizona sycamore	Arizona	Due to abundant spring rains, Sycamore Anthracnose caused defoliation and stem dieback in riparian zones in north-central Arizona.
ABIOTIC			
Drought	Ponderosa pine Pinyon	Arizona, New Mexico	Precipitation was above normal in 1992. However, bark beetle outbreaks which havecontinued on the Coronado and Lincoln National Forests and Mescalero Apache Indian Reservation are likely related to moisture stress of previous years.
Salt damage	Ponderosa pine	New Mexico Arizona	Needle discoloration occurred along high elevations in New Mexico and Arizona from salt used to deice highways. Salt damage was also observed on dirt roads in Arizona where salts were used for dust abatement.
Winter Injury	Alligator juniper	Arizona	No significant winter damage was reported in 1992.

Training

This years highlight was the Region-wide training session, "Management of Forest Pests through Silviculture" held in Kanab, Utah last September. Staff members from both the Arizona and New Mexico Zones gave presentations on insects and diseases of forest trees of the Southwest, with emphasis on biology and management. Field trips gave participants opportunities for group interaction and application of ideas. The session was well attended and well received. A similar session is scheduled to be held in Alamagordo, New Mexico with field trips on the Cloudcroft Ranger District, Lincoln National Forest, in September 1993.

A session designed specifically for the management of insects and diseases and hazard trees in recreation areas was held at Alto (north of Ruidoso), New Mexico in April, 1992. This session addressed the causes of tree defects emphasizing the recognition and management of hazard trees.

Aerial detection surveys

Over 9.4 million acres of Federal lands in Arizona and New Mexico were surveyed during July through September 1992. Forest Pest Management personnel survey nearly all forested land in the Region (except pinyon-juniper woodlands) annually. Other areas, including pinyon-juniper woodlands, are flown on request. Ground examinations are often made to confirm observations. Upon completion of the surveys, maps showing the type, location, and extent of insect and disease activity are prepared and sent to the respective administrative units. Aerial surveys are a cost effective way of detecting major forest pest activity. Done annually, they provide an excellent way to monitor changes in pest activity over time. State pest management specialists conduct aerial and ground surveys on State and private lands.

Detection kits and surveillance reports

Detection kits and surveillance reports sent to us from forest workers are an important means of early detection of potential pest problems. Land managers and forest workers are encouraged to continue prompt reporting of any unusual insect and disease activity. Detection kits containing vials and bags for specimens, along with a surveillance work sheet are available from both Forest Pest Management Zone Offices.

Trapping bark beetles, Sacramento Mountains, New Mexico

Since 1990 an infestation of ponderosa pine bark beetles has resulted in the mortality of a large number of ponderosa pine in the Sacramento Mountains, New Mexico. There was some concern that high value ponderosa pine in recreational sites would be killed, bark beetle mortality from Forest Service lands would spill over into private land, and that ponderosa pine would be replaced by more disease susceptible trees on pine sites.

Pheromones have been known to affect the behavior of bark beetles. Anti-aggregation pheromones also known as anti-attractants have been used to protect stands of trees but there was a difference in how western pine beetle responded to a combination of the two different forms of its anti-attractant

pheromone named verbenone. The research suggested that populations of western pine beetles separated geographically would respond differently. A technology development project for testing five different combinations of the two different forms of verbenone was set up in 1992. Since little information about the Sacramento Mountains. Population of western pine beetle was known this same study was also useful for determining how many major bark beetle flights were occurring each year and the time of the flights (flight periodicity). Funnel traps (Lingren) were used to catch the bark beetles and their predators. A three compound attractant (bait) was used with the anti-attractant to make sure that the anti-attractant was adequately challenged. Control traps with only the attractant were used to determine the largest number of beetles that could be caught by the funnel traps and as a determination of flight periodicity. Not enough western pine beetle were caught per collection period (7 days) to determine the difference between verbenone combinations or difference from the controls. Catches seemed to be more associated with the trap location (traps that were located where beetles were commonly flying). Large numbers of the roundheaded pine beetle were caught in late fall.

Stump pulling, Jemez Ranger District, Santa Fe National Forest

In May and June 1992, stump pulling was conducted in three different cutting-treatment units (clearcut, patch cut, and overstory removal cut) of the Bonito Timber Sale (Jemez Ranger District, Santa Fe National Forest) to determine if stump removal would decrease the impact of Armillaria root rot. Each of these units was divided into three equal parts based on the number of new and old stumps. A different stump removal intensity was randomly chosen for each third of the unit (no removal, new stumps, or new and old stumps). The stump puller was able to extract most stumps less than 24 inches in diameter, and larger stumps that had been cracked into smaller segments. A combination of excavation and pulling or excavation alone had to be used for larger stumps. Excavation resulted in much more site disturbance than stump pulling. The cost was high (approximately $2,300 per acre) compared to a similar stump removal operation in Washington State that used the same puller. They only attempted to pull stumps that would pull within 5 minutes so their costs ($44 per acre) were only 2 percent of what was spent in this operation. They did not have the strict requirements of site disturbance and could remove big stumps with a D8 caterpillar.

A total of 598 new and 127 old stumps were removed from the three treatment areas. After a cleanup operation to remove the stumps that were missed the treatments will be planted with a mixture of species to determine the regeneration capacity of the three units and for the three different treatment intensities within each unit.

Establishment of permanent plots

Twenty-three new permanent plots were established in the mixed conifer (17 plots) and ponderosa pine (6 plots) forest cover types on the Carson (17 plots), Cibola (3 plots) and Lincoln (3 plots) National Forests in 1992 in New Mexico. In Arizona 7 permanent plots were established in the ponderosa pine type on the Coconino National Forest and two in the mixed conifer type on the Apache-Sitgreaves National Forest. These plots were established as part of the "Pest Trend Impact Plots in the West" project. The purpose of the project is to establish and monitor permanent plots in areas affected by specific insects and diseases and use the information to validate the pest subroutines of the Prognosis growth and yield
model. The 2-year-old plots established in Arizona in 1990 were checked for mortality in 1992.

Table 3. Dwarf Mistletoe Presuppression Surveys and Suppression Projects Conducted During 1992 on National Forest and Bureau of Indian Affairs Trust Lands.

Federal Agency	Presuppression Survey Acres	Suppression Project Acres
National Forest		
Carson	7,717	1162
Gila		100
Kaibab	13,000	700
Lincoln		30
Prescott	2,500	
Santa Fe	1,200	210
Tonto	12,000	22,600
Reservation		
Fort Apache	20,000	
Isleta	5,979	
Jicarilla		101
Mescalero		238
Santa Clara		89
Zuni		38

BIOLOGICAL EVALUATIONS COMPLETED IN 1992

ARIZONA ZONE

1. Post-treatment Biological Evaluation of the Summit Burn Dwarf MistletoeSuppression Project. 2/92. (3420 letter).

2. Post-treatment Biological Evaluation of the Carrizo Burn Dwarf Mistletoe Suppression Project. 3/17/92. (3420 letter)

3. Biological Evaluation of Potential Hazard Trees on the Long Valley Ranger District Compound. 4/17/92. (3420 letter).

4. Biological Evaluation of Watson Dwarf Mistletoe Project, Tusayan Ranger District, Kaibab National Forest. 7/9/92. (3420 letter)

5. Diagnosis of Douglas-fir and White fir Mortality at Chevelon Ranger District, 8/3/92, (Douglas-fir Beetle and Fir Engraver, 3400 letter).

6. Forest Pest Management Review of Draft Recovery Plan for the Mt. Graham Red Squirrel, 9/8/92. (3400 letter).

7. Ponderosa Pine Mortality on the Chalendar Ranger District, 9/30/92, (Bark Beetles, 3400 letter).

8. Functional Assistance Trip to the Blue Ridge Ranger District. 10/5/92. (Cliffrose and Gambel Oak, 3400 letter)

9. Functional Assistance on Insects and Diseases Affecting TREES Certification Stand, Blue Ridge Ranger District, Coconino National Forest, 10/28/92. (3400 letter).

10. Biological Evaluation of the Mars Hill Dwarf Mistletoe Suppression Project. 10/92. (3420 letter)

11. Biological Evaluation of the 1993 Kaufman Dwarf Mistletoe Control Project, Chalendar Ranger District. 10/92. (3420 letter).

12. Biological Evaluation of Ponderosa Pine Mortality on the Bradshaw Ranger District, 11/18/92, (Bark Beetles, 3420 letter).

13. Functional Assistance on Insects and Diseases Affecting TREES Certification Stand, Chevelon Ranger District, Apache-Sitgreaves National Forest. 11/30/92. (3400 letter)

14. Functional Assistance to the Safford Ranger District, 12/4/92, (Roundheaded Pine Beetle Outbreak, 3400 letter).

15. Functional Assistance on Insects and Diseases Affecting TREES Certification Stand, Springerville Ranger District, Apache-Sitgreaves National Forest. 12/11/92. (3400 letter)

16. Functional Assistance on Insects and Diseases Affecting TREES Certification Stand, Bradshaw Ranger District, Prescott National Forest. 12/11/92. (3400 letter)

17. Functional Assistance on Insects and Diseases Affecting TREES Certification Stand, Chalendar Ranger District, Kaibab National Forest. 11/30/92. (3400 letter)

18. Biological Evaluation of the Reneke and Round Dwarf Mistletoe Suppression Projects, Williams Ranger District, Kaibab National Forest. 12/18/92. (3420 letter).

19. Biological Evaluation of Insect and Disease Conditions in the Bear Canyon Lake Recreation Area, Chevelon Ranger District, Apache-Sitgreaves National Forest. 2/16/93. (3420 Letter).

NEW MEXICO

1. Evaluation of American Creek Mesa, Cuba Ranger District, Santa Fe National Forest. 1/8/92 (3420 letter).

2. Pinyon Pine Defoliation in Burro Mountains and Juniper Mortality Long Forest Service Road 255, Silver City Ranger District, Gila National Forest. 1/9/92 (3420 letter).

3. Post-treatment Evaluation of Blanco Dwarf Mistletoe Suppression Project (1981-83), Espanola Ranger District, Santa Fe National Forest. 1/15/92 (3420 letter) .

4. White Pine Blister Rust (letter to the Chief). 3/19/92 (3420 letter).

5. Post-treatment Evaluation of Lupita Dwarf Mistletoe Suppression Project (1985-86), Jemez Ranger District, Santa Fe National Forest. 3/25/92 (3420 letter).

6. Evaluation of Fort Bayard Biodiversity Reserve Area, Silver City Ranger District, Gila National Forest. 5/11/92 (3420 letter).

7. Guadalupe Mountains White Pine Blister Rust Survey. 6/1/92 (3420 letter).

8. Dry Canyon Planning Area, Cloudcroft Ranger District, Lincoln National Forest. 6/8/92 (3420 letter).

9. El Rito Dwarf Mistletoe Control Project, El Rito Ranger District, Carson National Forest. 6/17/92 (3420 letter).

10. Evaluation of Spruce Trees at the El Rito Ranger District Office, Carson National Forest. 6/18/92 (3420 letter).

11. Western Spruce Budworm Evaluation, Camino Real Ranger District, Carson National Forest. 6/24/92 (3420 letter).

12. Winter Storm Damage, Jemez Pueblo Indian Reservation. 6/26/92 (3420 letter).

13. Sheep and Blanco Dwarf Mistletoe Control Projects, Espanola Ranger District, Santa Fe National Forest. 7/29/92 (3420 letter).

14. Foliage Disease Along Cherry Creek, Silver City Ranger District, Gila National Forest. 7/30/92 (3420 letter).

15. Hazard Tree Evaluation of Amphitheatre Site, Silver Campground, Cloudcroft Ranger District, Lincoln National Forest. 8/28/92 (3420 letter).

16. Dwarf mistletoe Control Projects, Camino Real Ranger District, Carson National Forest. 9/3/92 (3420 letter).

17. Dwarf Mistletoe Control Projects, Mescalero Apache Indian Reservation. 9/14/92 (3420 letter).

18. Pinyon pine mortality, Capulin Volcano National Monument. 9/14/92. (3420 letter)

19. Potential Treatment Areas on Mangas Mountain, Quemado Ranger District, Gila National Forest. 9/16/92 (3420 letter).

20. Deer Pond Dwarf Mistletoe Control Project, Santa Clara Indian Reservation. 11/9/92 (3420 letter).

21. Dwarf Mistletoe Control Project, Pecos Ranger District, Santa Fe National Forest. 11/10/92 (3420 letter).

22. Brushy Mountain Dwarf Mistletoe Control Project, Acoma Pueblo Indian Reservation. 11/23/92 (3420 letter).

23. Post-treatment Evaluation of Entranas 90-B Dwarf Mistletoe Control project, Camino Real Ranger District, Carson National Forest. 12/1/92 (3420 letter).

24. Evaluation of Cutting Units on the Bonito Diversity/IFP Demonstration Area, Jemez Ranger District, Santa Fe National Forest. 12/1/92 (3420 letter).

25. Bark Beetle Survey of Sacramento Mountains, Cloudcroft Ranger District, Lincoln National Forest. 12/4/92 (3420 letter).

26. Borrego Dwarf Mistletoe/Forest Health Project, Espanola Ranger District, Santa Fe National Forest. 12/21/92.

PUBLICATIONS

1. Fairweather, M. L. 1992. Post-treatment Evaluation of Turkey Creek Dwarf Mistletoe Suppression Project Fort Apache Indian Reservation. R-3 92-01.8 p.

2. Fairweather, M.L. and M.S. Frank. 1992. Annual Southwestern Pest Conditions Report 1991. USDA Forest Service, Southwestern Region Report. R-3 92-01. 19 p.

3. Fairweather, M.L. and R.L. Gilbertson. 1992. Inonotus andersonii: A Wood Decay Fungus of Oak Trees in Arizona. p. 195-198. In: Ffolliott, P.F.; Gottfried, B.J.; Bennett, D.A.; Hernandez C., V.M.; Ortega-Rubio, A.; Hamre, R.H., Tech. Coords. Ecology and Management of Oak and Associated Woodlands: Perspectives in the Southwestern United States and Northern Mexico; 1992 April 27-30; Sierra Vista, Arizona. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Gen. Tech. Rep. RM-218. 224 p.

4. Wilson, J.L. and B.M. Tkacz. 1992. Pinyon Ips Outbreak in Pinyon Juniper Woodlands in Northern Arizona: A Case Study. p. 187-190. In: Ffolliott, P.F.; Gottfried, B.J.; Bennett, D.A.; Hernandez C., V.M.; Ortega-Rubio, A.; Hamre, R.H., Tech. Coords. Ecology and Management of Oak and Associated Woodlands: Perspectives in the Southwestern United States and Northern Mexico; 1992 April 27-30; Sierra Vista, Arizona. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Gen. Tech. Rep. RM-218. 224 p.

APPENDIX

PONDEROSA PINE MORTALITY BY IPS BEETLES
as of 11/01/92

Reporting Unit	District	ACRES AFFECTED Nat Forest	Other fed	Private	State	Total	# of Faders	Fader vol (cu.ft.)
Apache-Sitgreaves NF								
	Alpine RD	10	0	0	0	10	45	1350
	Heber RD	40	0	0	0	40	50	1500
	Lakeside RD	5	0	0	0	5	10	300
	Springerville RD	15	0	0	0	15	40	1200
	SUBTOTALS	70	0	0	0	70	145	4350
BIA Phoenix Area								
	San Carlos Agency	0	81	0	0	81	110	3300
	Fort Apache Agency	0	238	0	0	238	60	1800
	SUBTOTALS	0	319	0	0	319	170	5100
Coconino Nat. Forest								
	Blue Ridge RD	25	0	0	0	25	45	1350
	Mormon Lake RD	25	0	0	0	25	45	1350
	Peaks RD	165	0	0	0	165	585	17550
	Long Valley RD	165	0	0	0	165	395	11850
	SUBTOTALS	380	0	0	0	380	1070	32100
Coronado Nat. Forest								
	Santa Catalina RD	10	0	0	0	10	5	150
	SUBTOTALS	10	0	0	0	10	5	150
Kaibab Nat. Forest								
	Chalender RD	65	0	0	0	65	50	1500
	North Kaibab RD	5	0	0	0	5	5	150
	SUBTOTALS	70	0	0	0	70	55	1650
Prescott Nat. Forest								
	Bradshaw RD	445	0	0	0	445	690	20700
	Chino Valley RD	30	0	0	0	30	150	4500
	SUBTOTALS	475	0	0	0	475	840	25200
Saguaro Nat. Mon.								
		0	5	0	0	5	15	450
	SUBTOTALS	0	5	0	0	5	15	450
Tonto Nat. Forest								
	Payson RD	2080	0	0	0	2080	4435	133050
	SUBTOTALS	2080	0	0	0	2080	4435	133050
		NFL	OFL	NIP	ST	TOTAL	FADERS	FADER VOL
	TOTALS	3085	324	0	0	3409	6735	202050

TRUE FIR MORTALITY CAUSED BY TRUE FIR COMPLEX
as of 11/01/92

Reporting Unit	District	ACRES AFFECTED Nat Forest	Other fed	Private	State	Total	# of Faders	Fader vol (cu.ft.)
Apache-Sitgreaves NF								
	Chevelon RD	75	0	0	0	75	50	2000
	Alpine RD	20	0	0	0	20	40	1600
	Springerville RD	30	0	0	0	30	65	2600
	SUBTOTALS	125	0	0	0	125	155	6200
BIA Phoenix Area								
	Fort Apache Agency	0	150	0	0	150	50	2000
	SUBTOTALS	0	150	0	0	150	50	2000
Chiricahua Nat. Mon.								
		0	5	0	0	5	5	200
	SUBTOTALS	0	5	0	0	5	5	200
Coconino Nat. Forest								
	Long Valley RD	20	0	0	0	20	40	1600
	Mormon Lake RD	30	0	0	0	30	75	3000
	Peaks RD	15	0	0	0	15	25	1000
	Blue Ridge RD	150	0	0	0	150	200	8000
	SUBTOTALS	215	0	0	0	215	340	13600
Coronado Nat. Forest								
	Santa Catalina RD	230	0	0	0	230	445	17800
	SUBTOTALS	230	0	0	0	230	445	17800
Kaibab Nat. Forest								
	Chalender RD	45	0	0	0	45	35	1400
	North Kaibab RD	960	0	0	0	960	3085	123400
	SUBTOTALS	1005	0	0	0	1005	3120	124800
Tonto Nat. Forest								
	Pleasant Valley RD	250	0	0	0	250	530	21200
	SUBTOTALS	250	0	0	0	250	530	21200
		NFL	OFL	NIP	ST	TOTAL	FADERS	FADER VOL
	TOTALS	1825	155	0	0	1980	4645	185800

MORTALITY CAUSED BY DOUGLAS-FIR BEETLES
as of 11/01/92

Reporting Unit	District	ACRES AFFECTED Nat Forest	Other fed	Private	State	Total	# of Faders	Fader vol (cu.ft.)
Apache-Sitgreaves NF								
	Springerville RD	20	0	0	0	20	35	1750
	Chevelon RD	10	0	0	0	10	15	750
	Alpine RD	130	0	0	0	130	255	12750
	SUBTOTALS	160	0	0	0	160	305	15250
BIA Phoenix Area								
	Fort Apache Agency	0	140	0	0	140	75	3750
	SUBTOTALS	0	140	0	0	140	75	3750
Coconino Nat. Forest								
	Peaks RD	220	0	0	0	220	340	17000
	SUBTOTALS	220	0	0	0	220	340	17000
Coronado Nat. Forest								
	Santa Catalina RD	5	0	0	0	5	10	500
	Safford RD	10	0	0	0	10	15	750
	SUBTOTALS	15	0	0	0	15	25	1250
Kaibab Nat. Forest								
	Chalender RD	45	0	0	0	45	75	3750
	Williams RD	30	0	0	0	30	30	1500
	SUBTOTALS	75	0	0	0	75	105	5250
Tonto Nat. Forest								
	Payson RD	530	0	40	0	570	1350	67500
	Pleasant Valley RD	50	0	0	0	50	35	1750
	Globe RD	15	0	0	0	15	10	500
	SUBTOTALS	595	0	40	0	635	1395	69750

	NFL	OFL	NIP	ST	TOTAL	FADERS	FADER VOL
TOTALS	1065	140	40	0	1245	2245	112250

PONDEROSA PINE MORTALITY BY WESTERN PINE BEETLES
as of 11/01/92

Reporting Unit	District	ACRES AFFECTED Nat Forest	Other fed	Private	State	Total	# of Faders	Fader vol (cu.ft.)
Apache-Sitgreaves NF								
	Heber RD	40	0	5	0	45	75	3750
	Chevelon RD	5	0	0	0	5	10	500
	Lakeside RD	30	0	0	0	30	55	2750
	SUBTOTALS	75	0	5	0	80	140	7000
BIA Phoenix Area								
	Fort Apache Agency	0	175	0	0	175	875	43750
	San Carlos Agency	0	40	0	0	40	80	4000
	SUBTOTALS	0	215	0	0	215	955	47750
Coconino Nat. Forest								
	Long Valley RD	5	0	0	0	5	10	500
	Peaks RD	80	0	0	0	80	125	6250
	Mormon Lake RD	15	0	0	0	15	30	1500
	SUBTOTALS	100	0	0	0	100	165	8250
Coronado Nat. Forest								
	Santa Catalina RD	32	0	0	0	32	30	1500
	SUBTOTALS	32	0	0	0	32	30	1500
Kaibab Nat. Forest								
	North Kaibab RD	50	0	0	0	50	65	3250
	SUBTOTALS	50	0	0	0	50	65	3250
Saguaro Nat. Mon.								
		0	15	0	0	15	30	1500
	SUBTOTALS	0	15	0	0	15	30	1500
Tonto Nat. Forest								
	Globe RD	45	0	0	0	45	85	4250
	Tonto Basin RD	95	0	0	0	95	135	6750
	Payson RD	115	0	0	0	115	200	10000
	SUBTOTALS	255	0	0	0	255	420	21000
		NFL	OFL	NIP	ST	TOTAL	FADERS	FADER VOL
	TOTALS	512	230	5	0	747	1805	90250

MORTALITY CAUSED BY ROUNDHEADED PINE BEETLES/WESTERN PINE BEETLES
as of 11/01/92

Reporting Unit	District	ACRES AFFECTED Nat Forest	Other fed	Private	State	Total	# of Faders	Fader vol (cu.ft.)
Coronado Nat. Forest								
	Safford Ranger Dist.	745	0	0	0	745	3385	101550
	SUBTOTALS	745	0	0	0	745	3385	101550
		NFL	OFL	NIP	ST	TOTAL	FADERS	FADER VOL
	TOTALS	745	0	0	0	745	3385	101550

MORTALITY CAUSED BY SPRUCE BEETLES
as of 11/01/92

Reporting Unit	District	ACRES AFFECTED Nat Forest	Other fed	Private	State	Total	# of Faders	Fader vol (cu.ft.)
Apache-Sitgreaves NF								
	Springerville RD	25	0	0	0	25	45	2250
	SUBTOTALS	25	0	0	0	25	45	2250
		NFL	OFL	NIP	ST	TOTAL	FADERS	FADER VOL
	TOTALS	25	0	0	0	25	45	2250

ASPEN DEFOLIATION
as of 11/01/92

Reporting Unit	District	National Forest Land L	M	H	T	Other Fed Land L	M	H	T	Non-Ind Priv Land L	M	H	T	Totals L	M	H	T
Apache-Sitgreaves NF																	
	Springerville RD	50	0	0	50	0	0	0	0	0	0	0	0	50	0	0	50
	SUBTOTALS	50	0	0	50	0	0	0	0	0	0	0	0	50	0	0	50
BIA Phoenix Area																	
	Fort Apache Agency	0	0	0	0	265	0	115	380	0	0	0	0	265	0	115	380
	SUBTOTALS	0	0	0	0	265	0	115	380	0	0	0	0	265	0	115	380
Coconino Nat. Forest																	
	Mormon Lake RD	40	280	280	600	0	0	0	0	0	0	0	0	40	280	280	600
	Blue Ridge RD	0	60	0	60	0	0	0	0	0	0	0	0	0	60	0	60
	Peaks RD	100	250	50	400	0	0	0	0	0	0	0	0	100	250	50	400
	SUBTOTALS	140	590	330	1060	0	0	0	0	0	0	0	0	140	590	330	1060
Coronado Nat. Forest																	
	Santa Catalina RD	30	0	0	30	0	0	0	0	0	0	0	0	30	0	0	30
	Douglas RD	40	190	120	350	0	0	0	0	0	0	0	0	40	190	120	350
	Safford RD	40	140	10	190	0	0	0	0	0	0	0	0	40	140	10	190
	SUBTOTALS	110	330	130	570	0	0	0	0	0	0	0	0	110	330	130	570
Kaibab Nat. Forest																	
	Chalender RD	20	40	0	60	0	0	0	0	0	0	0	0	20	40	0	60
	North Kaibab RD	60	310	210	580	0	0	0	0	0	0	0	0	60	310	210	580
	Williams RD	0	270	0	270	0	0	0	0	0	0	0	0	0	270	0	270
	SUBTOTALS	80	620	210	910	0	0	0	0	0	0	0	0	80	620	210	910
Prescott Nat. Forest																	
	Chino Valley RD	0	160	0	160	0	0	0	0	0	0	0	0	0	160	0	160
	Bradshaw RD	30	0	80	110	0	0	0	0	0	0	0	0	30	0	80	110
	SUBTOTALS	30	160	80	270	0	0	0	0	0	0	0	0	30	160	80	270
Tonto Nat. Forest																	
	Globe RD	40	160	150	350	0	0	0	0	0	0	0	0	40	160	150	350
	SUBTOTALS	40	160	150	350	0	0	0	0	0	0	0	0	40	160	150	350

National Forest Land L	M	H	T	Other Fed Land L	M	H	T	Non-Ind Priv Land L	M	H	T	Totals L	M	H	T
450	1860	900	3210	265	0	115	380	0	0	0	0	715	1860	1015	3590

WESTERN SPRUCE BUDWORM DEFOLIATION
as of 11/01/92

Reporting Unit	District	National Forest Land L	M	H	T	Other Fed Land L	M	H	T	Non-Ind Priv Land L	M	H	T	Totals L	M	H	T
Apache-Sitgreaves NF																	
	Alpine RD	3770	1300	0	5070	0	0	0	0	0	0	0	0	3770	1300	0	5070
	SUBTOTALS	3770	1300	0	5070	0	0	0	0	0	0	0	0	3770	1300	0	5070
Coconino Nat. Forest																	
	Peaks RD	900	50	0	950	0	0	0	0	0	0	0	0	900	50	0	950
	SUBTOTALS	900	50	0	950	0	0	0	0	0	0	0	0	900	50	0	950
Coronado Nat. Forest																	
	Santa Catalina RD	15	0	0	15	0	0	0	0	0	0	0	0	15	0	0	15
	SUBTOTALS	15	0	0	15	0	0	0	0	0	0	0	0	15	0	0	15
Kaibab Nat. Forest																	
	North Kaibab RD	5150	340	0	5490	0	0	0	0	0	0	0	0	5150	340	0	5490
	SUBTOTALS	5150	340	0	5490	0	0	0	0	0	0	0	0	5150	340	0	5490

National Forest Land L	M	H	T	Other Fed Land L	M	H	T	Non-Ind Priv Land L	M	H	T	Totals L	M	H	T
9835	1690	0	11525	0	0	0	0	0	0	0	0	9835	1690	0	11525

DAMAGE BY DOUGLAS-FIR BEETLES
as of 04/01/93

REPORTING UNIT	DISTRICT	ACRES AFFECTED				NUMBER OF FADERS	FADER VOL. (cu.ft.)
		NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL		
CARSON NF							
	CAMINO REAL RD	5	0	0	5	5	250
	QUESTA RD	35	0	5	40	75	3750
	SUBTOTALS	40	0	5	45	80	4000
CIBOLA NE							
	SANDIA RD	5	0	0	5	10	500
	SUBTOTALS	5	0	0	5	10	500
LINCOLN NF							
	CLOUDCROFT RD	10	0	0	10	15	750
	SMOKEY BEAR RD	5	0	0	5	5	250
	SUBTOTALS	15	0	0	15	20	1000
NAVAJO IR							
		0	870	0	870	1495	74750
	SUBTOTALS	0	870	0	870	1495	74750
SANTA FE NF							
	COYOTE RD	35	0	0	35	10	500
	CUBA RD	20	0	0	20	45	2250
	ESPANOLA RD	5	0	0	5	5	250
	PECOS RD	5	0	0	5	15	750
	SUBTOTALS	65	0	0	65	75	3750

	NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL	FADERS	FADER VOL.
TOTALS	125	870	5	1000	1680	84000

PONDEROSA PINE DAMAGE BY IPS BEETLES
as of 04/01/93

REPORTING UNIT	DISTRICT	ACRES AFFECTED				NUMBER OF FADERS	FADER VOL. (cu.ft.)
		NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL		
CIBOLA NF							
	MAGDELENA RD	5	0	0	5	5	150
	SUBTOTALS	5	0	0	5	5	150
NAVAJO IR							
		0	60	0	60	45	1350
	SUBTOTALS	0	60	0	60	45	1350
SANTA FE NF							
	CUBA RD	160	0	0	160	250	7500
	ESPANOLA RD	120	0	0	120	200	6000
	JEMEZ RD	80	0	0	80	200	6000
	SUBTOTALS	360	0	0	360	650	19500
		NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL	FADERS	FADER VOL.
	TOTALS	365	60	0	425	700	21000

PONDEROSA PINE DAMAGE BY MOUNTAIN PINE BEETLES
as of 04/01/93

REPORTING UNIT	DISTRICT	ACRES AFFECTED				NUMBER OF FADERS	FADER VOL. (cu.ft.)
		NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL		
CARSON NF							
	CAMINO REAL RD	5	0	0	5	5	250
	QUESTA RD	5	0	0	5	10	500
	SUBTOTALS	10	0	0	10	15	750
NAVAJO IR							
		0	850	0	850	505	25250
	SUBTOTALS	0	850	0	850	505	25250
SANTA CLARA IR							
		0	5	0	5	10	500
	SUBTOTALS	0	5	0	5	10	500
SANTA FE NF							
	COYOTE RD	70	0	0	70	140	7000
	CUBA RD	35	0	0	35	65	3250
	EASPANOLA RD	80	0	0	80	130	6500
	JEMEZ RD	55	0	0	55	105	5250
	PECOS-LV RD	60	0	0	60	65	3250
	SUBTOTALS	300	0	0	300	505	25250
TAOA PUEBLO IR							
		0	10	0	10	20	1000
	SUBTOTALS	0	10	0	10	20	1000
		NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL	FADERS	FADER VOL.
	TOTALS	310	865	0	1175	1055	52750

PONDEROSA PINE DAMAGE BY WESTERN PINE BEETLES
as of 04/01/93

REPORTING UNIT	DISTRICT	ACRES AFFECTED				NUMBER OF	FADER VOL.
		NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL	FADERS	(cu.ft.)
CIBOLA NF							
	MAGDELENA RD	45	0	0	45	30	1500
	MOUNT TAYLOR RD	165	0	0	165	340	17000
	MOUNTAINAIR RD	25	0	0	25	4	200
	SUBTOTALS	235	0	0	235	374	18700
GILA NF							
	BLACK RANGE RD	10	0	0	10	15	750
	GLENWOOD RD	5	0	0	5	10	500
	LUNA RD	15	0	0	15	30	1500
	MIMBRES RD	5	0	0	5	5	250
	QUEMADO RD	20	0	0	20	35	1750
	RESERVE RD	10	0	0	10	20	1000
	SILVER CITY RD	10	0	0	10	15	750
	SUBTOTALS	75	0	0	75	130	6500
LINCOLN NF							
	CLOUDCROFT RD	6425	0	0	6425	8390	419500
	MAYHILL RD	2055	0	0	2055	2760	138000
	SMOKEY BEAR RD	535	0	0	535	320	16000
	SUBTOTALS	9015	0	0	9015	11470	573500
MESCALERO APACHE							
		0	11385	0	11385	20990	1049500
	SUBTOTALS	0	11385	0	11385	20990	1049500

	NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL	FADERS	FADER VOL.
TOTALS	9325	11385	0	20710	32964	1648200

DAMAGE BY SPRUCE BEETLES
as of 04/01/93

REPORTING UNIT	DISTRICT	ACRES AFFECTED				NUMBER OF FADERS	FADER VOL. (cu.ft.)
		NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL		
CIBOLA NF							
	MOUNT TAYLOR RD	240	0	0	240	400	20000
	MOUNTAINAIR RD	5	0	0	5	5	250
	SANDIA RD	5	0	0	5	5	250
	SUBTOTALS	250	0	0	250	410	20500
LINCOLN NF							
	SMOKEY BEAR RD	240	0	0	240	100	5000
	SUBTOTALS	240	0	0	240	100	5000
MESCALERO APACHE							
		0	5	0	5	10	500
	SUBTOTALS	0	5	0	5	10	500
NAVAJO IR							
		0	240	0	240	315	15750
	SUBTOTALS	0	240	0	240	315	15750
SANTA FE NF							
	COYOTE RD	75	0	0	75	120	6000
	CUBA RD	135	0	0	135	115	5750
	ESPANOLA RD	35	0	0	35	50	2500
	JEMEZ RD	5	0	0	5	10	500
	PECOS-LAS-VEGAS R	50	0	0	50	85	4250
	SUBTOTALS	300	0	0	300	380	19000
		NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL	FADERS	FADER VOL.
	TOTALS	790	245	0	1035	1215	60750

DAMAGE BY TRUE FIR BEETLES
as of 04/01/93

REPORTING UNIT	DISTRICT	ACRES AFFECTED NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL	NUMBER OF FADERS	FADER VOL. (cu.ft.)
CARSON NF							
	CAMINO REAL RD	5	0	0	5	5	200
	QUESTA RD	5	0	0	5	5	200
	SUBTOTALS	10	0	0	10	10	400
CIBOLA NF							
	MAGDELENA RD	50	0	0	50	65	2600
	MOUNT TAYLOR RD z	5	0	0	5	5	200
	SANDIA RD	20	0	0	20	35	1400
	SUBTOTALS	75	0	0	75	105	4200
LINCOLN NF							
	CLOUDCROFT RD	5	0	0	5	5	200
	SMOKEY BEAR RD	10	0	0	10	20	800
	SUBTOTALS	15	0	0	15	25	1000
NAVAJO IR							
		0	180	0	180	215	8600
	SUBTOTALS	0	180	0	180	215	8600
SANTA FE NF							
	COYOTE RD	5	0	0	5	5	200
	CUBA RD	150	0	0	150	230	9200
	PECOS-LAS VEGAS R	45	0	0	45	110	4400
	SUBTOTALS	200	0	0	200	345	13800

	NATIONAL FOREST	OTHER FEDERAL	PRIVATE	TOTAL	FADERS	FADER VOL.
TOTALS	300	180	0	480	700	28000

ASPEN DEFOLIATION
as of 04/01/93

REPORTING UNIT	DISTRICT	NATIONAL FOREST LAND				OTHER FEDERAL LAND				NON-INDUSTRIAL PRIVATE LAND				TOTAL			
		L	M	H	T	L	M	H	T	L	M	H	T	L	M	H	T
CARSON NF																	
	CAMINO REAL RD	120	280	520	920	0	0	0	0	0	0	0	0	120	280	520	920
	ELRITO RD	3240	640	80	3960	0	0	0	0	0	0	0	0	3240	640	80	3960
	QUESTA RD	240	120	80	440					0	0	0	0				
	TRE PIEDRAS RD	3520	1960	240	5720	0	0	0	0	0	0	0	0	3520	1960	240	5720
	SUBTOTALS	7120	3000	920	11040	0	0	0	0	0	0	0	0	6880	2880	840	10600
CIBOLA NF																	
	MAGDELENA RD	0	40	40	80	0	0	0	0	0	0	0	0	0	40	40	80
	MOUNT TAYLOR RD	80	0	0	80	0	0	0	0	0	0	0	0	80	0	0	80
	MOUNTAINAIR RD	0	0	320	320	0	0	0	0	0	0	0	0	0	0	320	320
	SANDIA RD	40	80	0	120	0	0	0	0	0	0	0	0	40	80	0	120
	SUBTOTALS	120	120	360	600	0	0	0	0	0	0	0	0	120	120	360	600
GILA NF																	
	BLACK RANGE RD	0	0	40	40	0	0	0	0	0	0	0	0	0	0	40	40
	GLENWOOD RD	40	80	0	120	0	0	0	0	0	0	0	0	40	80	0	120
	SUBTOTALS	40	80	40	160	0	0	0	0	0	0	0	0	40	80	40	160
LINCOLN NF																	
	SMOKEY BEAR RD	400	1080	0	1480	0	0	0	0	0	0	0	0	400	1080	0	1480
	SUBTOTALS	400	1080	0	1480	0	0	0	0	0	0	0	0	400	1080	0	1480
MESCALERO APACHE																	
		0	0	0	0	240	240	0	480	0	0	0	0	240	240	0	480
	SUBTOTALS	0	0	0	0	240	240	0	480	0	0	0	0	240	240	0	480
NAVAJO IR																	
		0	0	0	0	240	120	0	360	0	0	0	0	240	120	0	360
	SUBTOTALS	0	0	0	0	240	120	0	360	0	0	0	0	240	120	0	360
SANTA CLARA PUEBL																	
		0	0	0	0	0	80	0	80	0	0	0	0	0	80	0	80
	SUBTOTALS	0	0	0	0	0	80	0	80	0	0	0	0	0	80	0	80
SANTA FE NF																	
	CUBA RD	120	0	40	160	0	0	0	0	0	0	0	0	120	0	40	160
	COYOTE RD	0	160	0	160	0	0	0	0	0	0	0	0	0	160	0	160
	ESPANOLA RD	120	400	520	1040	0	0	0	0	0	0	0	0	120	400	520	1040
	JEMEZ RD	0	40	0	40	0	0	0	0	0	0	0	0	0	40	0	40
	PECOS-LAS VEGAS	240	640	120	1000	0	0	0	0	0	0	0	0	240	640	120	1000
	SUBTOTALS	480	1240	680	2400	0	0	0	0	0	0	0	0	480	1240	680	2400
TAOS PUEBLO IR																	
		0	0	0	0	200	160	0	360	0	0	0	0	200	160	0	360
	SUBTOTALS	0	0	0	0	200	160	0	360	0	0	0	0	200	160	0	360

	NATIONAL FOREST LAND				OTHER FEDERAL LAND				NON-INDUSTRIAL PRIVATE LAND				TOTAL			
	L	M	H	T	L	M	H	T	L	M	H	T	L	M	H	T
TOTALS	8160	5520	2000	15680	680	600	0	1280	0	0	0	0	8600	6000	1920	16520

WESTERN SPRUCE BUDWORM DEFOLIATION
as of 04/01/93

REPORTING UNIT	DISTRICT	NATIONAL FOREST LAND				OTHER FEDERAL LAND				NON-INDUSTRIAL PRIVATE LAND				TOTAL			
		L	M	H	T	L	M	H	T	L	M	H	T	L	M	H	T
GILA NF																	
	QUEMADO RD	480	0	0	480	0	0	0	0	0	0	0	0	480	0	0	480
	SUBTOTALS	480	0	0	480	0	0	0	0	0	0	0	0	480	0	0	480
LINCOLN NF																	
	SMOKEY BEAR RD	0	40	40	80	0	0	0	0	0	0	0	0	0	40	40	80
	SUBTOTALS	0	40	40	80	0	0	0	0	0	0	0	0	0	40	40	80
SANTA CLARA PUEBL																	
		0	0	0	0	0	160	0	160	0	0	0	0	0	160	0	160
	SUBTOTALS	0	0	0	0	0	160	0	160	0	0	0	0	0	160	0	160
SANTA FE NF																	
	ESPANOLA RD	0	1520	0	1520	0	0	0	0	0	0	0	0	0	1520	0	1520
	PECOS-LAS VEGAS	80	0	0	80	0	0	0	0	0	0	0	0	80	0	0	80
	SUBTOTALS	80	1520	0	1600	0	0	0	0	0	0	0	0	80	1520	0	1600

	NATIONAL FOREST LAND				OTHER FEDERAL LAND				NON-INDUSTRIAL PRIVATE LAND				TOTAL			
	L	M	H	T	L	M	H	T	L	M	H	T	L	M	H	T
TOTALS	560	1560	40	2160	0	160	0	160	0	0	0	0	560	1720	40	2320

PONDEROSA PINE NEEDLECAST
as of 04/01/93

REPORTING UNIT	DISTRICT	NATIONAL FOREST LAND				OTHER FEDERAL LAND				NON-INDUSTRIAL PRIVATE LAND				TOTAL			
		L	M	H	T	L	M	H	T	L	M	H	T	L	M	H	T
BANDELIER NAT'L M																	
		0	0	0	0	0	280	0	280	0	0	0	0	0	280	0	280
	SUBTOTALS	0	0	0	0	0	280	0	280	0	0	0	0	0	280	0	280
CARSON NF																	
	CAMINO REAL RD	1000	3840	400	5240	0	0	0	0	0	0	0	0	1000	3840	400	5240
	QUESTA RD	840	1360	0	2200	0	0	0	0	0	0	0	0	840	1360	0	2200
	TRES PIEDRAS RD	80	80	0	160	0	0	0	0	0	0	0	0	80	80	0	160
	SUBTOTALS	1920	5280	400	7600	0	0	0	0	0	0	0	0	1920	5280	400	7600
CIBOLA NF																	
	MOUNT TAYLOR RD	680	0	0	680	0	0	0	0	0	0	0	0	680	0	0	680
	SUBTOTALS	680	0	0	680	0	0	0	0	0	0	0	0	680	0	0	680
JEMEZ PUEBLO IR																	
		0	0	0	0	0	120	0	120	0	0	0	0	0	120	0	120
	SUBTOTALS	0	0	0	0	0	120	0	120	0	0	0	0	0	120	0	120
LINCOLN NF																	
	SMOKEY BEAR RD	0	240	0	240	0	0	0	0	0	0	0	0	0	240	0	240
	SUBTOTALS	0	240	0	240	0	0	0	0	0	0	0	0	0	240	0	240
MESCALERO APACHE																	
		0	0	0	0	1000	200	0	1200	0	0	0	0	1000	200	0	1200
	SUBTOTALS	0	0	0	0	1000	200	0	1200	0	0	0	0	1000	200	0	1200
NAVAJO IR																	
		0	0	0	0	0	560	0	560	0	0	0	0	0	560	0	560
	SUBTOTALS	0	0	0	0	0	560	0	560	0	0	0	0	0	560	0	560
PICURIS PUEBLO IR																	
		0	0	0	0	0	200	200	400	0	0	0	0	0	200	200	400
	SUBTOTALS	0	0	0	0	0	200	200	400	0	0	0	0	0	200	200	400
SANTA CLARA PUEBL																	
		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SUBTOTALS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SANTA FE NF																	
	COYOTE RD	1880	0	0	1880	0	0	0	0	0	0	0	0	1880	0	0	1880
	CUBA RD	1520	0	0	1520	0	0	0	0	0	0	0	0	1520	0	0	1520
	ESPANOLA RD	320	0	0	320	0	0	0	0	0	0	0	0	320	0	0	320
	JEMEZ RD	1640	560	120	2320	0	0	0	0	0	0	0	0	1640	560	120	2320
	PECOS-LAS VEGAS	1080	800	0	1880	0	0	0	0	0	0	0	0	1080	800	0	1880
	SUBTOTALS	6440	1360	120	7920	0	0	0	0	0	0	0	0	6440	1360	120	7920

	NATIONAL FOREST LAND				OTHER FEDERAL LAND				NON-INDUSTRIAL PRIVATE LAND				TOTAL			
	L	M	H	T	L	M	H	T	L	M	H	T	L	M	H	T
TOTALS	9040	6880	520	16440	1000	1360	200	2560	0	0	0	0	10040	8240	720	19000

Mexican scientists examine white pine blister rust near Cloudcroft, NM

Bob Borys inspects the collection of beetles from a Lingren trap

Forest Pest Management Specialist guides
the grapple of stump puller into postion

Stump puller being used to pull a pine
stump in an area with Armillaria root rot.